

# THE BASIC UNIT OF LIFE-CELLS

When different types of cells are viewed under a microscope, different cell parts can be seen. Certain living cells are best for showing parts like a nucleus or cell membrane. Once living (preserved) cells are best for showing parts like a cell wall. Cells from producer organisms (plants) will show parts such as chloroplasts, and cell walls. Most consumer cells do not have these parts, although fungi have cell walls (a consumer). We will not consider fungi in this investigation.

In this investigation, you will

- a) Observe a variety of living and once living materials under the microscope.
- b) Determine if these materials do or do not show a cellular type of organization.
- c) Study and locate under the microscope six specific cell parts—cell wall, cell membrane, cytoplasm, nucleus, nucleolus, and chloroplasts.
- d) Compare the cell parts found in plant and animal cells.

## Materials

Microscope  
Microscope slides  
Cover slips  
Water  
Prepared slide of cork  
Iodine stain  
Toothpicks  
Dropper  
Saxophone reed  
Methylene blue stain  
Onion  
Elodea (water plant)  
Prepared slide of frog blood

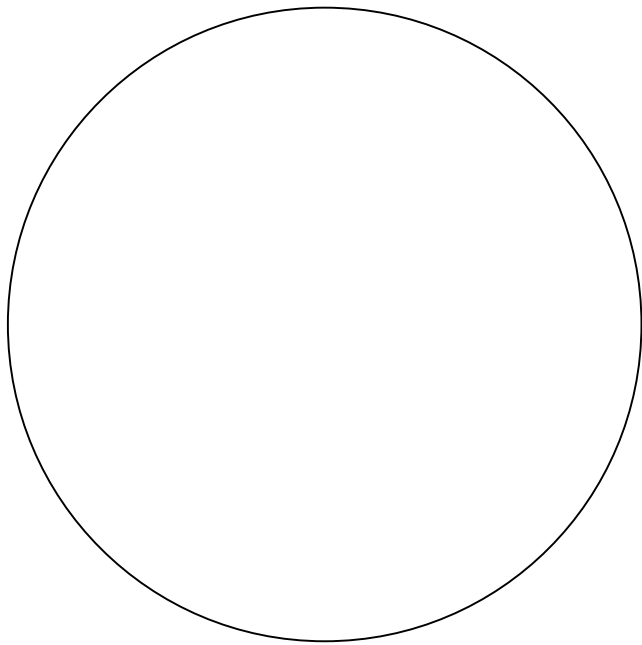
## Procedure

### Part A. The Cell Wall

Cork cells are excellent for studying a cell part common to all plants cells. This part is the cell wall. In a cork cell, the cell wall is easily visible.

The cork is no longer living. The cell wall remains as the only evidence of once living materials.

- Examine the prepared cork slide under high power
- Use the space on the next page to draw several cork cells as they appear under high magnification. Label the cell wall.



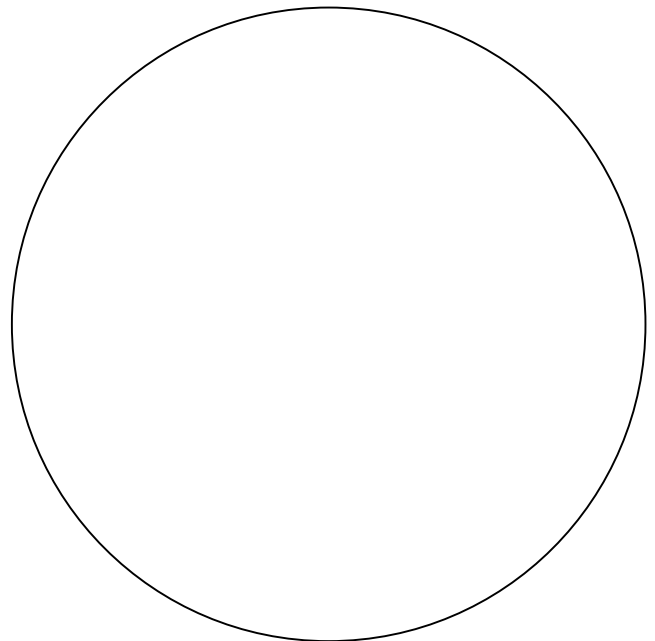
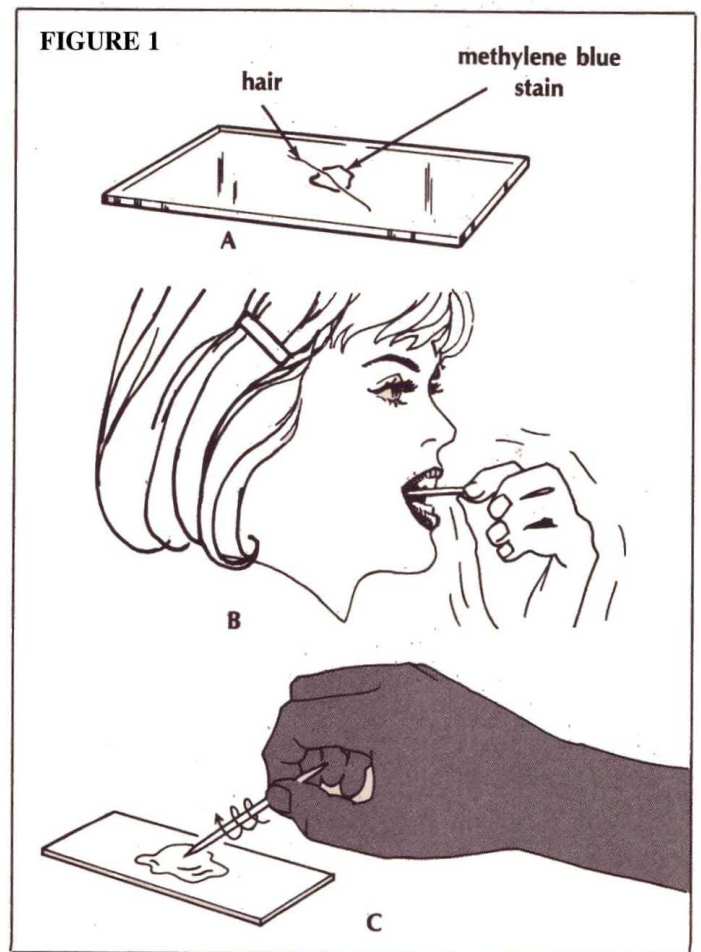
**CORK CELLS**

## Part B. Cell Membrane and Cytoplasm

Human cheek cells may be used for viewing the cell membrane and cytoplasm. A cell membrane is a thin outer boundary which surrounds the cell and separates it from neighboring cell.

Cytoplasm is the jellylike inner portion of the cell

- Place a drop of methylene blue stain and a strand of hair onto a slide. Use Figure 1A as a guide.
- *Gently* scrape the inside of your cheek with the end of a toothpick. You will not be able to see anything on the toothpick when you remove it from your mouth (Figure 1B).
- Dip the toothpick into the stain on the slide and mix once or twice by swirling your toothpick in the stain (Figure 1C).
- Add a coverslip and examine under high power of your microscope. (Use the hair as an aid in locating the proper depth for the cells)
- Locate and examine cells that are separated from one another rather than those that are in clumps.
- Use the space to the right to draw several cheek cells as they appear under high magnification. Label the cell membrane and cytoplasm.



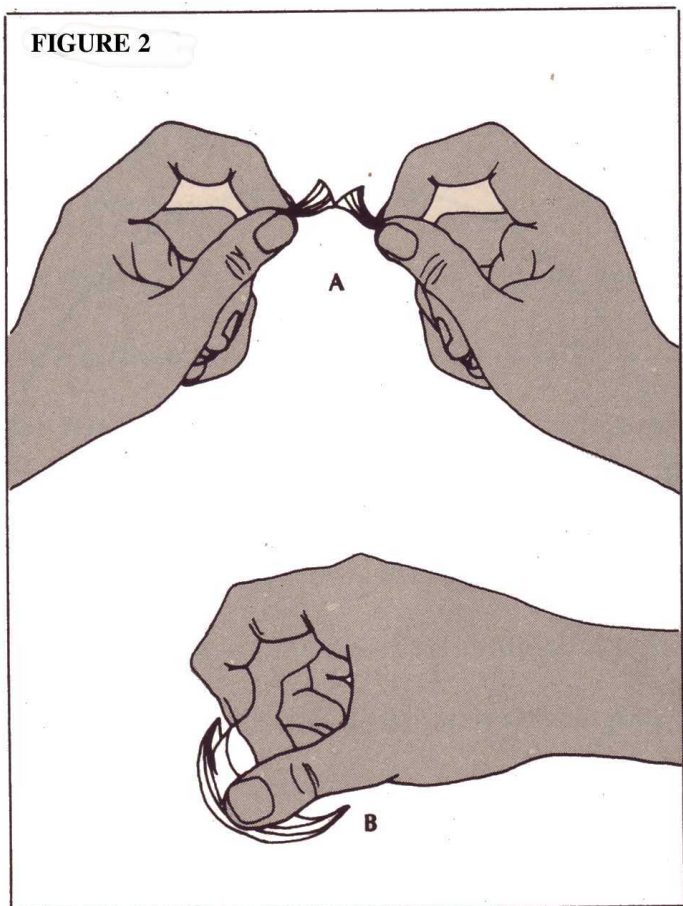
**CHEEK CELLS**

## Part C. Cell Nucleus

Onion cells may be used to show a cell's nucleus and nucleolus. These two structures appear within most living cells. The nucleus will appear as a round structure inside each cell.

Follow these steps in preparing onion cells for your wet mount:

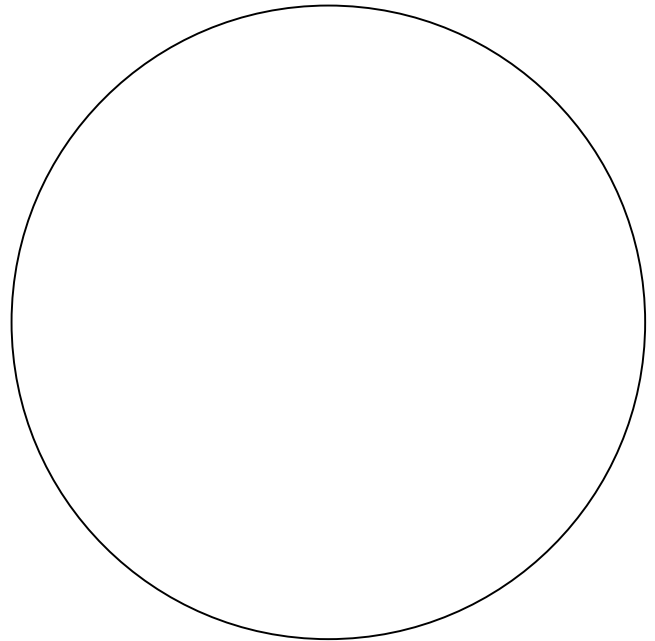
- Snap a piece of onion in half (Figure 2A).
- Use your fingernail to peel off a thin layer of onion tissue (Figure 2B). The cell layer must come from the inside surface.
- Place one thin layer onto a microscope slide.
- Uncurl or unfold any overlapped portion of the cell layer. Make sure the layer is perfectly flat. Add a drop or two of iodine stain to the onion.
- CAUTION: If iodine spillage occurs, rinse with water and call your teacher immediately.
- Add a coverslip to the stained onion. Tap the coverslip gently with the erasure end of a pencil to drive out any air bubbles.



- Observe the cells under high power of your microscope. Note the brick wall appearance of the cells with cell walls separating the cells.
- Locate a small round structure, the nucleus, within each cell. Examine a nucleus carefully by focusing up and down through the cell.

The outer edge of the nucleus is made up of a thin covering called the nuclear membrane.

- Diagram a several onion cell in the space provided as it appears under high magnification.
- Label the cell wall, nucleus, and nuclear membrane.

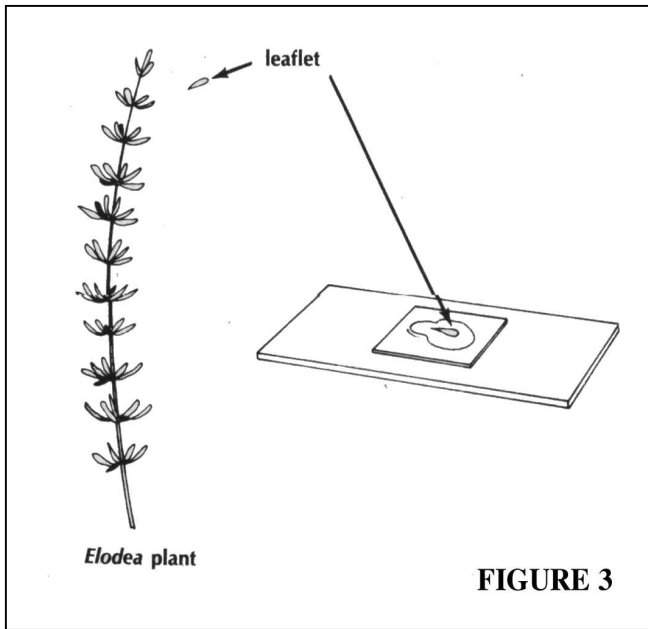


ONION CELL

## Part D. Chloroplast

Another cell part found in the cells of many producers is the green chloroplast. *Elodea*, a common water plant, shows these important structures well.

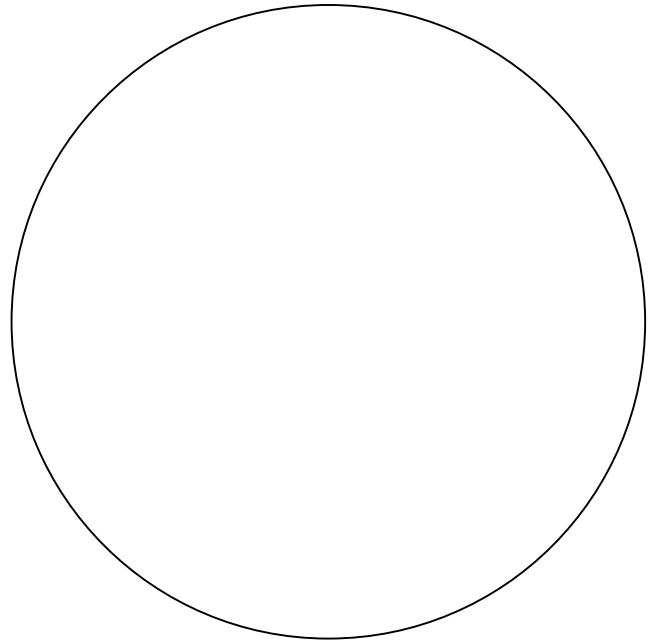
- Prepare a wet mount of an *Elodea* leaflet. Use figure 3 on the next page as a guide.



## Part E. Plant or Animal Cell?

### Bamboo Stem

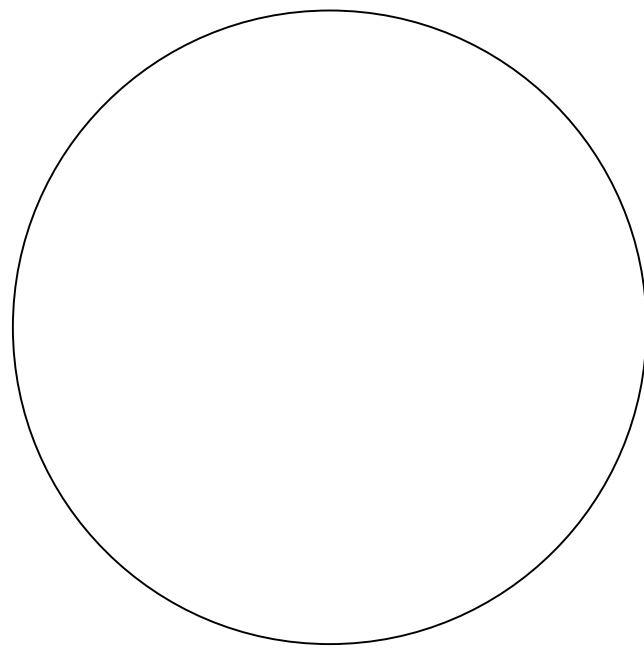
- Prepare a wet mount of bamboo stem cells.
- Observe the bamboo stem under low power.
- Diagram several bamboo cells in the space provided.
- Label the cell wall, cytoplasm, and nucleus only if these are present.



### BAMBOO CELLS

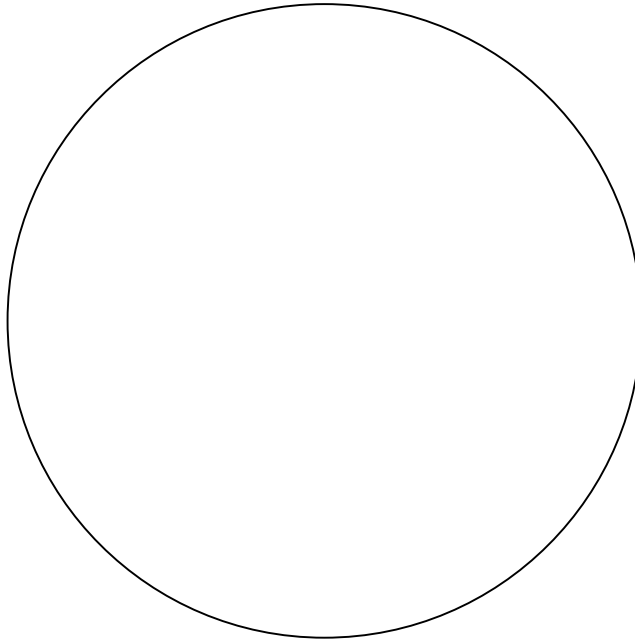
### Frog Blood

- Observe a prepared slide of frog blood under high power of your microscope. The color that you see is not natural. Stains have been added to these cells to make viewing easier.
- Diagram several frog blood cells in the space provided on the next page.
- Label the cell wall, cell membrane, cytoplasm, and nucleus only if these parts are present.



### ELODEA CELL

- Using low power of your microscope, position your slide so you are looking near the edge of the leaflet. Locate green, oblong cells. Examine these under high power.
- Note the small green organelles inside each cell. These are chloroplasts. Movement of the chloroplasts within the cell often can be observed. Attempt to locate moving chloroplasts.
- Diagram several *Elodea* cell in the space provided. Use high power.
- Label the cell wall and chloroplast.



### **FROG BLOOD CELLS**

## **Analysis**

### **Analysis, Part A:**

1. Is the cork used alive? \_\_\_\_\_
2. What are the small units that can be seen under high power called? \_\_\_\_\_
3. Do these units appear filled or empty? \_\_\_\_\_
4. What specific cell part is all that remains of the cell? \_\_\_\_\_
5. In 1665, Robert Hooke, an English scientist, reported an interesting observation while looking through his microscope at cork. "I took a good clear piece of cork, and with a penknife sharpened as keen as a razor, I cut a piece of it off, then examining it with a microscope, me thought I could perceive it to appear a little porous, much like a honeycomb, but that the pores were not regular."
  - (a) What were the "honeycomb" units at which Hooke was looking? \_\_\_\_\_
  - (b) What specific cell part was all that was left of the cork? \_\_\_\_\_
6.
  - (a) Is cork produced by a plant or animal? \_\_\_\_\_
  - (b) Do animal cells have cell walls? \_\_\_\_\_
7. Use your text to determine the name of the compound which makes up the cell wall. \_\_\_\_\_

### Analysis, Part B:

1. Describe the shape of the cheek cell. \_\_\_\_\_
2. (a) Are cheek cells produced by plants or animals? \_\_\_\_\_  
(b) Is a cell wall present? \_\_\_\_\_
3. Are cheek cells alive? \_\_\_\_\_
4. Describe the location of the cell membrane. \_\_\_\_\_
5. What is the function of the cell membrane? \_\_\_\_\_  
\_\_\_\_\_
6. Describe the location of the cell's cytoplasm. \_\_\_\_\_
7. Why was stain added to the cheek cells? \_\_\_\_\_
8. Do you have evidence that living things (or once living things) are composed of basic units called cells? \_\_\_\_\_ Explain using information from the lab. \_\_\_\_\_  
\_\_\_\_\_

### Analysis, Part C:

1. (a) Are onion cells produced by plants or animals? \_\_\_\_\_  
(b) Is a cell wall present? \_\_\_\_\_
2. (a) Describe the shape of the nucleus of an onion cell. \_\_\_\_\_  
(b) Describe the location of the nucleus. \_\_\_\_\_
3. What is the function of the cell's nucleus? \_\_\_\_\_  
\_\_\_\_\_
4. What structure separates the contents of the nucleus from the cytoplasm? \_\_\_\_\_
5. Why are the cells stained? \_\_\_\_\_

### Analysis, Part D

1. Describe the shape of an *Elodea* cell. \_\_\_\_\_

2. (a) Is *Elodea* a plant or animal? \_\_\_\_\_

(b) Is a cell wall present? \_\_\_\_\_

3. Describe the

(a) color of the chloroplasts. \_\_\_\_\_

(b) shape of the chloroplasts. \_\_\_\_\_

4. What is the function of the chloroplast? \_\_\_\_\_

5. Are chloroplast usually present in consumer cells? \_\_\_\_\_

### Analysis, Part E:

1. Describe the shape of bamboo cells. \_\_\_\_\_

2. (a) Can a cell wall be seen in bamboo? \_\_\_\_\_

(b) Is bamboo a plant or animal? \_\_\_\_\_ Explain using information from the lab.

\_\_\_\_\_

3. Describe the shape of frog blood cells. \_\_\_\_\_

4. (a) Can a cell wall be seen in frog blood cells? \_\_\_\_\_

(b) Are blood cells from a producer or consumer? \_\_\_\_\_ Explain. \_\_\_\_\_

\_\_\_\_\_

5. (a) What cell part name is used to describe the outer edge of a frog blood cell? \_\_\_\_\_

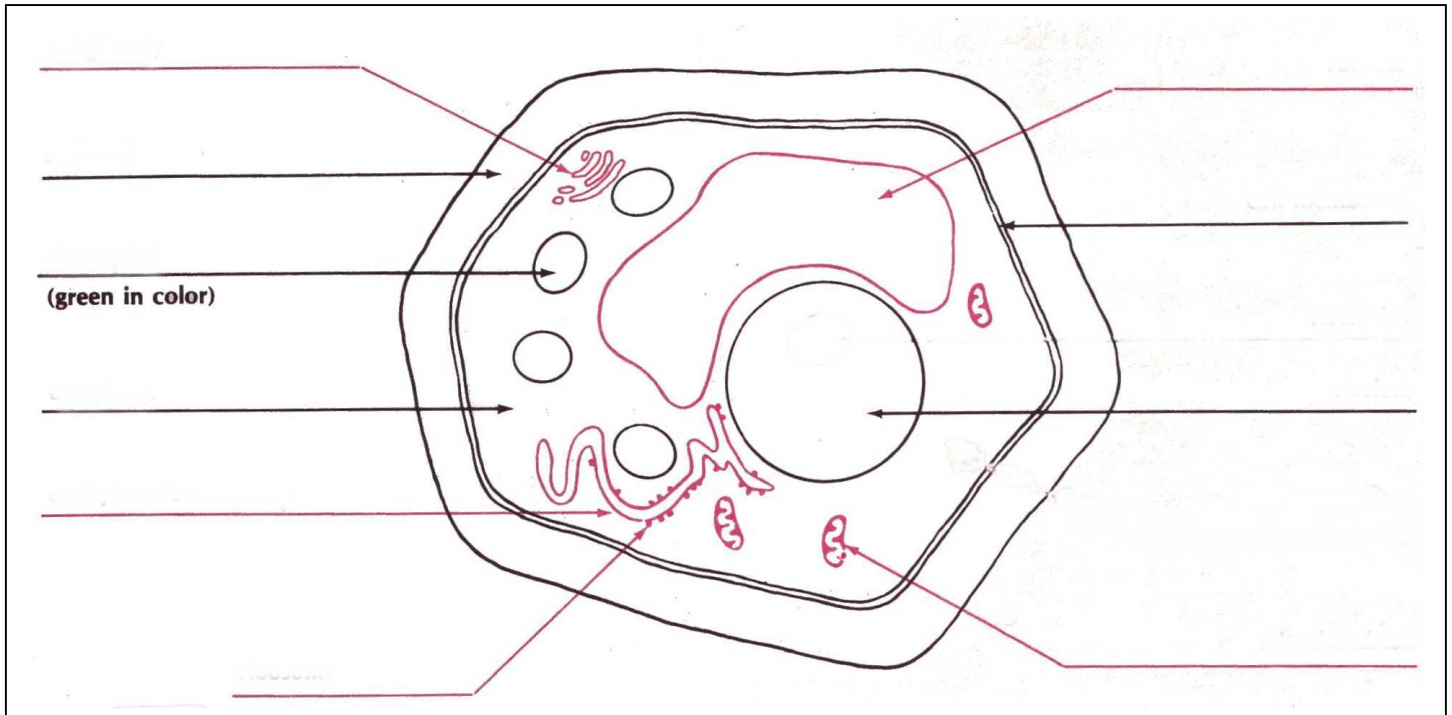
(b) What cell part name is used to describe the dark center of a frog blood cell? \_\_\_\_\_

### Analysis, General:

1. Complete this chart. Indicate by using check marks for each structure contained in a plant or animal cell.

	NUCLEUS	CELL WALL	CYTOPLASM	NUCLEAR MEMBRANE	CHLOROPLASTS	CELL MEMBRANE
Animal Cell						
Plant Cell						

2. Label the following parts in the diagram below of a “typical plant cell”: *vacuoles*, *mitochondria*, *golgi bodies*, *endoplasmic reticulum*, and *ribosomes*, *cell wall*, *cytoplasm*, *cell membrane*, *chloroplast*, and *nucleus*.



3. Label the following parts in the diagram below of a “typical animal cell”: *mitochondria*, *golgi bodies*, *endoplasmic reticulum*, *ribosomes*, *cytoplasm*, *cell membrane*, and *nucleus*.

